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**Title:** Observed Differences in Spectral Microphysical Retrievals from MODIS

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**Abstract:**

The microphysical structure of clouds is of fundamental importance for understanding a variety of cloud radiation and physical processes. With the advent of MODIS (Moderate Resolution Imaging Spectroradiometer) on the NASA EOS Terra and Aqua platforms, simultaneous global/daily 1km retrievals of cloud effective particle size are available using the heritage 3.7  $\mu\text{m}$  band from AVHRR as well as the 1.6 and 2.1  $\mu\text{m}$  shortwave IR bands. The MODIS cloud product (MOD06/MYD06 for MODIS Terra and Aqua, respectively) provides separate effective radii results using each of these spectral bands. It has been found that significant differences can occur between the three size retrievals, mainly for liquid water marine boundary layer clouds and especially in broken (low cloud fraction) regimes. In particular, for such regimes, effective radii derived from the MODIS 2.1  $\mu\text{m}$  band can be substantially larger than retrievals from the heritage 3.7  $\mu\text{m}$  band. In this paper, we present global and regional results of the differences, including correlations, view angle dependencies, and algorithm sensitivities for the existing MODIS Collection 5 product.